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Thermodynamics of Imidazolium-Based Ionic Liquids Containing PF6 Anions

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Abstract

© 2016 American Chemical Society.Imidazolium-based ionic liquids (ILs) with PF6- anions are considered as low-cost solvents for separation processes, but they exhibit restricted thermal stabilities. Reliable measurements of vaporization thermodynamics by conventional methods have failed. In this work, we applied a quartz-crystal microbalance method to determine for the first time the absolute vapor pressures for the [Cnmim][PF6] family, with n = 2, 4, 6, 8, and 10, in the temperature range 403-461 K. An absence of decomposition of ILs in experimental conditions was determined by the attenuated total reflection-infrared spectroscopy. The consistency of the experimental results within the homologous series was established through enthalpy and entropy analyses of the liquid and gas phases as well as by molecular dynamics simulations.

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